

EITEL-McCULLOUGH, INC.
SAN BRUNO, CALIFORNIA

2000T

MEDIUM-MU TRIODE
•
MODULATOR
OSCILLATOR
AMPLIFIER

The 2000T is a medium-mu, high-vacuum transmitting triode intended for amplifier, oscillator and modulator service. It has a maximum plate dissipation rating of 2000 watts. Cooling of the 2000T is accomplished by radiation from the plate, which operates at a visibly red temperature at maximum dissipation, and by means of forced air circulation around the envelope and at the seals.

GENERAL CHARACTERISTICS

ELECTRICAL

Filament: Thoriated tungsten
- Voltage - 10.0 volts
- Current - 25.0 amperes

Amplification Factor (Average) - 23

Direct Interelectrode Capacitances (Average)
- Grid-Plate - 8.5 μμfd.
- Grid-Filament - 12.7 μμfd.
- Plate-Filament - 1.7 μμfd.

Transconductance ($i_b = 1.75$ amp., $E_b = 6000$ v., $E_c = -95$ v.) 11,000 μmhos

MECHANICAL

- Base - Special 4-pin, No. 5006B
- Basing - RMA type 4BD
- Cooling - Radiation and forced air

Maximum Overall Dimensions:
- Length - 17.75 inches
- Diameter - 8.125 inches

Net weight - 3.5 pounds
Shipping weight (Average) - 8.5 pounds

RADIO FREQUENCY POWER AMPLIFIER AND OSCILLATOR

Class-C Telegraphy (Key-down conditions, 1 tube)

MAXIMUM RATINGS (Frequencies below 40 Mc.)

D-C PLATE VOLTAGE	▶8000 MAX. VOLTS
D-C PLATE CURRENT	1.75 MAX. AMPS.
PLATE DISSIPATION	2000 MAX. WATTS
GRID DISSIPATION	150 MAX. WATTS

TYPICAL OPERATION (Frequencies below 40 Mc.)

D-C Plate Voltage	5000	6000	7000	volts
D-C Grid Voltage	−350	−500	−600	volts
D-C Plate Current	1.35	1.35	1.15	amps
D-C Grid Current	175	165	120	ma.
Grid Dissipation	79	78	43	watts
Peak R-F Grid Input Voltage (approx.)	900	1050	1060	volts
Driving Power, (approx.)	140	160	115	watts
Plate Power Input	6670	8000	8000	watts
Plate Dissipation	2000	2000	2000	watts
Plate Power Output	4670	6000	6000	watts

AUDIO FREQUENCY POWER AMPLIFIER AND MODULATOR

Class-B (Sinusoidal wave, two tubes unless otherwise specified)

MAXIMUM RATINGS

D-C PLATE VOLTAGE	▶8000 MAX. VOLTS
MAX-SIGNAL D-C PLATE CURRENT, PER TUBE	1.75 MAX. AMPS.
PLATE DISSIPATION, PER TUBE	2000 MAX. WATTS
GRID DISSIPATION, PER TUBE	150 MAX. WATTS

TYPICAL OPERATION

D-C Plate Voltage	5000	6000	7000	volts
D-C Grid Voltage	−180	−230	−290	volts
Zero-Signal D-C Plate Current	480	400	350	ma.
Max-Signal D-C Plate Current	2.00	1.88	1.86	amps.
Effective Load, Plate-to-Plate	4900	6650	8500	ohms
Peak A-F Grid Input Voltage (per tube)	470	525	590	volts
Max-Signal Avg. Driving Power (approx.)	50	60	75	watts
Max-Signal Peak Driving Power	178	184	212	watts
Max-Signal Plate Dissipation (per tube)	2000	1875	2000	watts
Max-Signal Plate Power Output	6000	7500	9000	watts

▶Indicates change from sheet dated 6-15-44

APPLICATION

MECHANICAL

Mounting—The 2000T must be mounted vertically, base up or base down. Flexible connecting straps should be provided between the grid and plate terminals and the external grid and plate circuits. The tube must be protected from severe vibration and shock.

Cooling—The envelope and seals of the 2000T require artificial cooling. An ordinary 8- or 10-inch fan located one foot from the tube will provide sufficient air for cooling the envelope. The air should be directed at the tube in a manner which will allow the most uniform cooling of the envelope. The grid and plate seals each require a minimum flow of two cubic feet of air per minute. The air for the grid seal is fed through the grid connector. A special connector (Eimac HR-9) is available for this purpose. A special heat-dissipating connector (Eimac HR-8) is also available for use on the plate terminal. A minimum flow of two cubic feet of air per minute must likewise be supplied to the filament seals through the hole at the center of the base. Suitable electrical interlocks should be provided to remove the plate and filament voltages in the event that the supply of cooling air is interrupted.

ELECTRICAL

Filament Voltage—The filament voltage, as measured directly at the filament pins, should be between 9.5 and 10.5 volts.

Bias Voltage—Although there is no maximum limit on the bias voltage which may be used on the 2000T there is little advantage in using bias voltages in excess of those given under "Typical Operation," except in certain very specialized applications. Where bias is obtained by a grid leak, suitable protective means must be provided to prevent excessive plate dissipation in the event of loss of excitation.

Plate Voltage—The plate supply voltage for the 2000T should not exceed 8000 volts. In most cases there is little advantage in using plate-supply voltages higher than those given under "Typical Operation" for the power output desired.

Grid Dissipation—The power dissipated by the grid of the 2000T must not exceed 150 watts. Grid dissipation may be calculated from the following expression:

$$P_g = e_{cmp} I_c$$

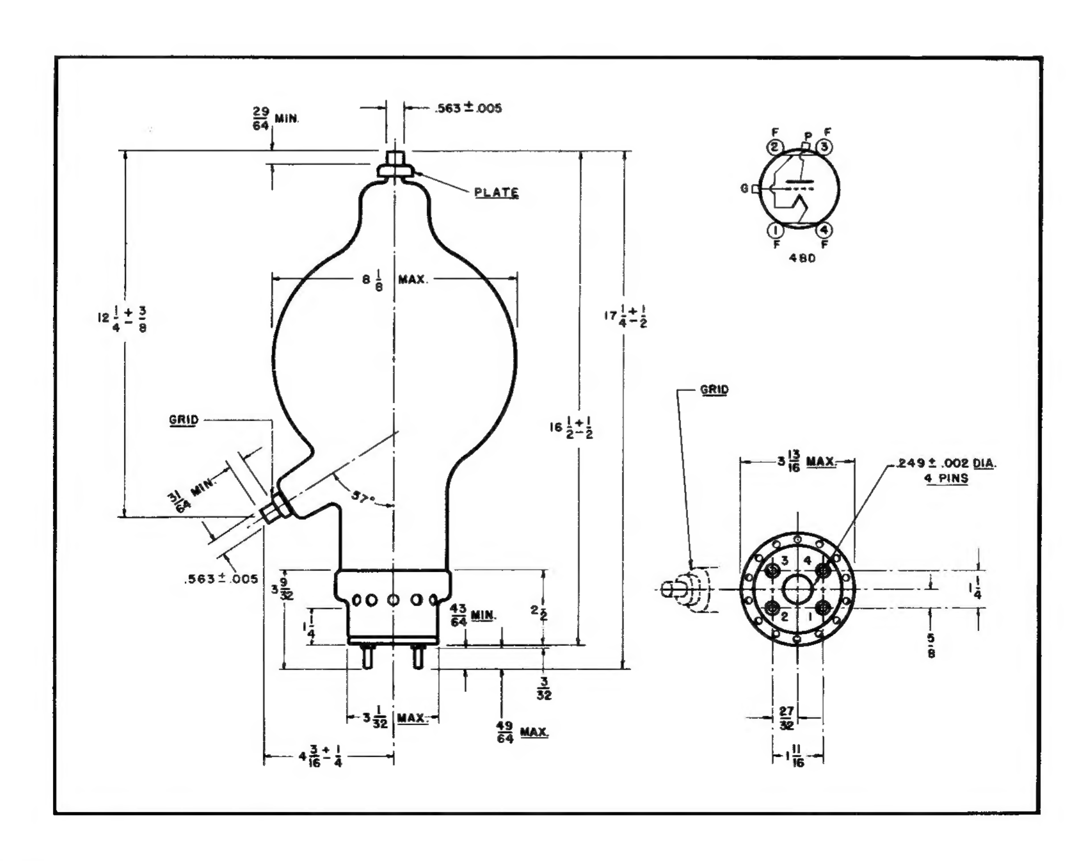
where P_g = Grid dissipation,
e_{cmp} = Peak positive grid voltage, and
I_c = D-c grid current.

e_{cmp} may be measured by means of a suitable peak voltmeter connected between filament and grid.[1] In equipment in which the plate loading varies widely, such as oscillators used for radio-frequency heating, care should be taken to make certain that the grid dissipation does not exceed the maximum rating under any condition of loading.

Plate Dissipation—Under normal operating conditions, the power dissipated by the plate of the 2000T should not be allowed to exceed 2000 watts. Plate dissipation in excess of the maximum rating is permissible for short periods of time, such as during tuning procedures.

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[1] For suitable peak v.t.v.m. circuits see, for instance, "Vacuum Tube Ratings," **Eimac News**, January, 1945. This article is available in reprint form on request.





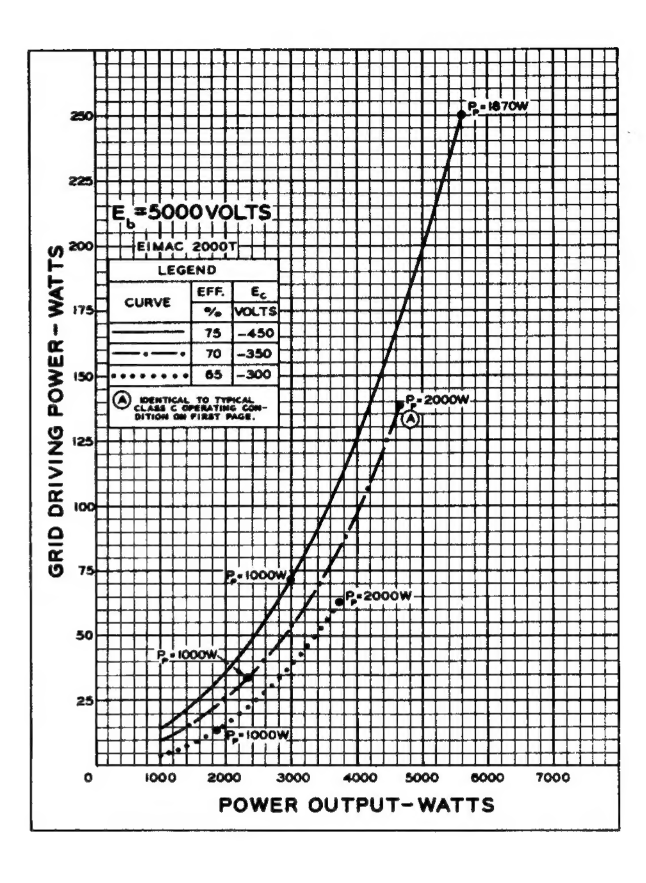
DRIVING POWER vs. POWER OUTPUT

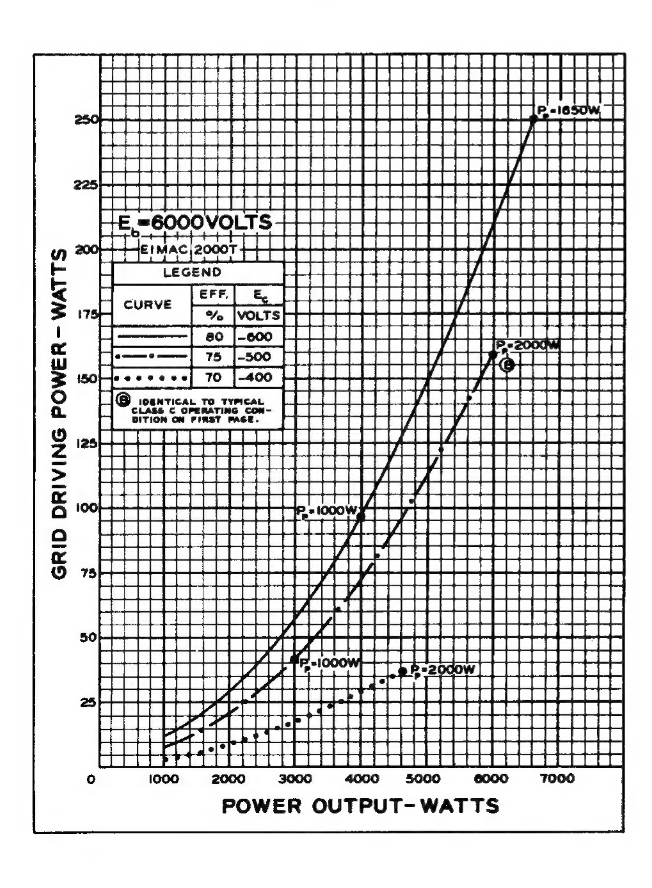
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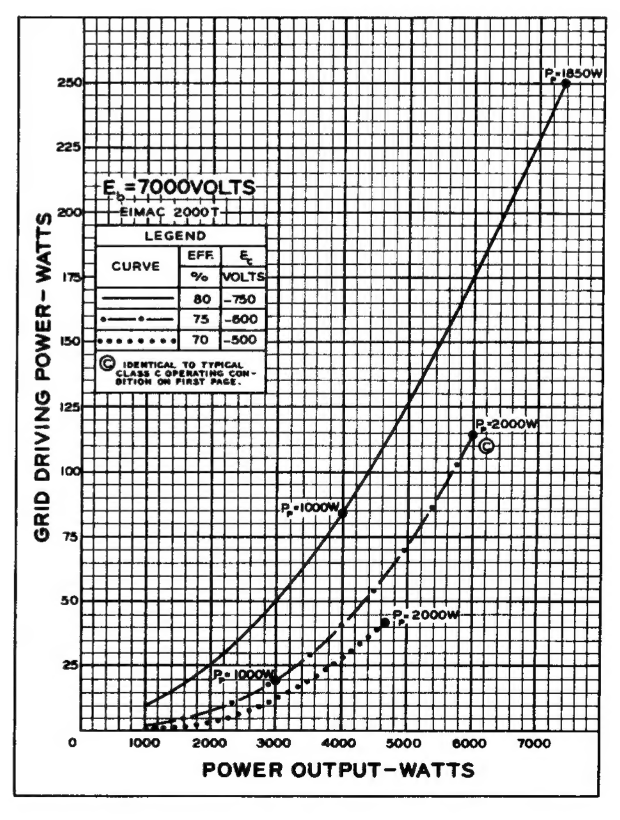
The three charts on this page show the relationship of plate efficiency, power output and grid driving power at plate voltages of 5000, 6000, and 7000 volts. These charts show combined grid and bias losses only. The driving power and power output figures do not include circuit losses. The plate dissipation in watts is indicated by P_p.

Points A, B, and C are identical to the typical Class C operating conditions shown on the first page under 5000, 6000, and 7000 volts respectively.

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GRID VOLTAGE—VOLTS

-600 -400 -200 0 200 400 600 800 1000

PLATE VOLTAGE — VOLTS

0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000

GRID CURRENT-AMPERES

2.80 2.40 2.00 1.80 1.60 1.40 1.20 1.00 .800 .600 .400 .200 .100 .050 0 -.100

.050 0 -.100

PLATE CURRENT-AMPERES

0 .100 .500 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.0

EIMAC 2000T
CONSTANT CURRENT
CHARACTERISTICS

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